

PDU Troubleshooting

The PDU Troubleshooting topic contains the following items:

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Note

For additional information about the PDU, refer to the [Troubleshooting Guide](#).

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Test Points

Test points for various voltages are available on the exterior of the PDU. The test points are current limited and scaled to a low level voltage. All test points are accurate to +/- 2 percent of actual. See the [Test Point Signals](#) table.

Test Point Signals

Test Point Signal	Description	Scale	Expected Range
Input AC Voltage	Proportional AC voltage to input AC voltage	100:1	0 to 5.3 Vrms
Output AC Voltage	Proportional AC voltage to output AC voltage	100:1	0 to 2.3 Vrms
Output DC Voltage	Proportional DC voltage to output DC voltage	10:1	0 to 10.0 VDC
Control AC Voltage	Wired directly to AC control voltage	1:1	0 to 28 Vrms
Control DC Voltage	Wired directly to DC control voltage	1:1	0 to 28 VDC

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Maintenance Signals

An amber maintenance light on the PDU indicates that the PDU controller watchdog timer has timed out and flashes various two-digit trouble codes for troubleshooting purposes when overtemperature or fan failure events have occurred.

Fan failure (various fans are distributed throughout the system), overtemperature (of various locations) , and processor malfunction (on the controller module) are the three implemented maintenance signals.

The timing/duration of each pulse (defined as a flash of the LED or presence of the MAINT output signal on J66 of the SMC) in the two-digit trouble code is as follows:

- Pulse duration is typically 600 ms
- Pause between digits is typically 1000 ms
- Pause between pulses within a digit is typically 500 ms
- Pause between successive trouble codes is typically 2000 ms

The specific trouble code indications are:

- A solid LED (not flashing) or constant HIGH output signal indicates that a PDU microprocessor reset is required.
- A single pulse for the first digit indicates a fan failure. The number of pulses (1- 10) for the second digit indicate the failed fan unit. Two pulses for the first digit indicates and overtemperature condition. The number of pulses (1- 3) for the second digit indicate the overtemperature sensor number.

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Connector Pinouts

Tester System Monitor/Controller (SMC) connector – J66 (25 Pin D-sub)

Pin Number	Signal	Description	Specification (input – output)
1 (return on pin 14)	48 V_ON	15 KHz signal that commands the 48V buss to turn on	5V, squarewave 15KHz ($\pm 2\%$)
2	GND	SMC Chassis ground	
3 (return on any COM)	V1	Proportional frequency to DC voltage, load side of F4*	5V, squarewave, 10 mV/ Hz 0V – 100Hz (-0Hz, +100Hz) 48V – 4.9KHz (± 100 Hz) 100V – 10.1 KHz (± 100 Hz)
4	COM	SMC common	
5 (return on any COM)	I1	Proportional frequency to DC current through F4*	5V, squarewave, 15 mA/ Hz 0A – 100Hz (-0Hz, +200Hz) 130A – 8.77 KHz (± 200 Hz) 150 A – 10.1 KHz (± 200 Hz)
6	COM	SMC common	
7 (return on any COM)	I2	Proportional frequency to DC current through F5*	5V, squarewave, 15 mA/ Hz 0A – 100Hz (-0Hz, +200Hz) 130A – 8.77 KHz (± 200 Hz) 150 A – 10.1 KHz (± 200 Hz)

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Pin Number	Signal	Description	Specification (input – output)
8 (return on any COM)	Vac	Proportional frequency to AC output voltage, phase A to C	5V, squarewave, 25 mV/Hz 0V – 100Hz (-0Hz, +100Hz) 208V – 8.42 KHz ($\pm$ 100Hz) 250V – 10.1 KHz ($\pm$ 100Hz)
9	COM	SMC common	
10 (return on any COM)	MAINT	Pattern of TTL signals indicating what type of maintenance is required	5V, squarewave Digit 1 (.6S on, .5S off) 1 Fan Failure 2 Over temperature 1S off between digits Digit 2 (.6S on, .5S off) 1-10 Failed Item Number 2S between trouble codes
11 (return on pin 23)	+5V	Supply voltage for all signals on J66	5VDC ($\pm$ 5%)
12	GND	SMC Chassis ground	
13 (return on pin 25)	K1_ON	15 KHz signal that commands the Test Power AC outputs to turn on	5V, squarewave 15KHz ($\pm$ 2%)
14	ON_RTN_48V	Return for 48V buss turn on signal	
15	GND	SMC Chassis ground	

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Pin Number	Signal	Description	Specification (input – output)
16 (return on any COM)	V0	Proportional frequency to DC voltage, line side of F4 and F5*	5V, squarewave, 10 mV/Hz 0V – 100Hz (-0Hz, +100Hz) 48V – 4.9KHz ($\pm$ 100 Hz) 100V – 10.1 KHz ($\pm$ 100Hz)
17	COM	SMC common	
18 (return on any COM)	V2	Proportional frequency to DC voltage, load side of F5*	5V, squarewave, 10 mV/Hz 0V – 100Hz (-0Hz, +100Hz) 48V – 4.9KHz ($\pm$ 100 Hz) 100V – 10.1 KHz ($\pm$ 100Hz)
19 (return on any COM)	Vab	Proportional frequency to AC output voltage, phase A to B	5V, squarewave, 25 mV/Hz 0V – 100Hz (-0Hz, +100Hz) 208V – 8.42 KHz ($\pm$ 100Hz) 250V – 10.1 KHz ($\pm$ 100Hz)
20	COM	SMC common	
21 (return on any COM)	Vbc	Proportional frequency to AC output voltage, phase B to C	5V, squarewave, 25 mV/Hz 0V – 100Hz (-0Hz, +100Hz) 208V – 8.42 KHz ($\pm$ 100Hz) 250V – 10.1 KHz ($\pm$ 100Hz)
22 (return on any COM)	FREQ	Squarewave signal indicating AC line frequency	5V, squarewave 50 Hz $\pm$ 3Hz – 50Hz ($\pm$ 1%) 60 Hz $\pm$ 3Hz – 60Hz ($\pm$ 1%)

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Pin Number	Signal	Description	Specification (input – output)
23	5VRTN	Return for signal voltage power supply	
24	GND	SMC Chassis ground	
25	ON_RTN_K1	Return for the Test Power AC outputs turn on signal	

* Refer to schematic drawing D-5 and D-6 and layout drawing number D-2, D-3, and D-4 for location of these components.



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System Interface Panel LEDs connector – J65 (9 Pin D-sub)

Pin Number	Signal	Description	Specification
1	PWR_AVAIL	High when input power is available to the PDU	5V ($\pm .5V$), On 0V ($\pm .5V$), Off
2	TEST_PWR_ON	High when the Test Power contactor has pulled in.	5V ($\pm .5V$), On 0V $\pm .5V$, Off
3	MAIN_PWR_ON	High when the main input breaker is on.	5V ($\pm .5V$), On 0V ($\pm .5V$), Off
4	48V_ENERGIZED	Voltage proportional to the 48V buss.	3.5V ($\pm .5V @ 20\Omega$ resistive) – 48VDC 0V ($\pm .5V @ 20\Omega$ resistive) – 0VDC
5	N/C		
6	PWR_AVAIL_RTN	Return for the signal indicating input power is available	
7	TEST_PWR_ON_RTN	Return for the signal indicating the Test Power AC contactor has pulled in	
8	MAIN_PWR_ON_RTN	Return for the signal indicating the main input breaker is on	
9	48V_ENERGIZED_RTN	Return for the voltage proportional the 48V buss.	

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Troubleshooting Table

Use the troubleshooting table, and refer to the [PDU Electrical Schematic](#). Also refer to the drawings and schematics in the Teal PDU Manual.

Test equipment (properly calibrated) required:

- DMM with RMS features (Fluke 87 or equivalent)
- Clamp-on, general-purpose ammeter (able to measure up to 350A)
- Temperature measuring device (able to measure up to 150 degrees C)
- Digital storage oscilloscope with isolated channel inputs (Tektronix THS720A or equivalent)
- Current probe, suitable for connection to oscilloscope: 10A range or higher, 10 MHz BW (for measuring gate signals)
- Current probe, suitable for connection to oscilloscope: 200A range or higher, capable of measuring 47-63 Hz currents that are DC biased (for measuring current into SCRs)

For all AC voltages, input to unit is specified to +10%, -15% of nominal rating. All other AC voltages within the PDU will vary proportionally with the input voltage that is present. Unless otherwise indicated below, you should see AC voltages +/-2% of the expected value after correcting for any non-nominal input voltage.

Note

The seven-digit part numbers with no hyphens are Teal part numbers.

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The seven-digit part numbers with no hyphens are Teal part numbers.

Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
AC output voltage too high or low	AC input voltage provided to PDU is too high or too low.	Measure input voltage.	ON	Tap change board and/or sheet V-1	Check input voltage at test points, should be +10% to -15% of expected voltage divided by 100	Re-tap distribution transformer or re-configure tap change board to match source voltage
	Main transformer incorrectly tapped	Measure input voltage and compare to the tap configuration	ON	Tap change board and/or sheet V-1	Check input voltage at test points, should be +10% to -15% of expected voltage divided by 100	Re-configure tap change board to match source voltage. (See tap change diagram on tap cover board)
	Loose connection at input breaker or tap change board	Inspect connections for proper torque	OFF	D-3, D-5, V-1	CB1 Input lug torque = 50 in-lbs, output lug torque = 120 in lbs. Tap change board lug torque = 50 in-lbs	Tighten connection at effected locations to specified torque

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
No voltage present on Un-switched AC output	No input voltage present	Measure input voltage at test points	ON	D-2	Check input voltage at test points, should be +10% to -15% of expected voltage divided by 100	Check and repair AC service
	Input CB1 tripped or off	Visual inspection	ON	D-2, D-5	CB1	Turn on input CB1
	Branch breaker tripped or off	Visual inspection	ON	D-2, D-5	CB4 - CB9	Check for overload problem, reset tripped branch breaker
	Loose connection between transformer secondary 1 and output CB4-CB9	Visual inspection and/or continuity check on effected circuit	OFF	D-2, D-5	Wire #'s 6-8, CB4-CB9	Tighten connections between main transformer secondary 1 and CB Check bus bar connections at inputs to breakers
	Loose connection between output CB and receptacles	Visual inspection and/or continuity check on effected circuit	OFF	D-2, D-5	CB4-CB9, J54-J62 (see distribution schematic for wire #'s)	Tighten connections on effected receptacle or CB

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	24V power supply failure	Check power supply input/output voltage at test points	ON	D-2, D-3, D-5	Input voltage between test points "24VAC" and "N" should be 20-28 VAC, Output voltage between "24VDC" test point and "N" test point should be 22-28 VDC	Replace power supply REG1 PN 361-154-00
	Failed output circuit breaker	Perform visual/operational inspection, and/or voltage check at output circuit breakers.	ON	D-2, D-5	CB4-CB9 input voltage should be 120VAC from any terminal to case ground. Output voltage should match input when breaker is "on", should be zero when breaker is "tripped" or "off"	Replace circuit breaker CB4-CB6 PN 523-354-16 or CB7-CB9 PN 522-995-16
	Control Circuit breaker failure	Perform visual/operational inspection, and/or voltage check at input/output of control circuit breakers	ON	D-2, D-5,	Check for normal operation of circuit breakers by measuring input and output from breaker CB2 and CB3	Reset or replace circuit breaker CB2 PN 522-995-02 or CB3 PN 523-354-04



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Control transformer failure	Check voltages at input and output of control transformer. CB2 may trip if T2 has an internal short. If CB3 is off when this happens, T2 failure is the likely cause.	ON	D-3, D-5	T2 input voltage should be +10% to -15% of expected input voltage between wire #s 94 & 95. Output should be 24VAC between wire #s 96 & 97	Replace control transformer T2 PN 541-242-00
	Failed output receptacle	Visually inspect receptacle and/or perform continuity check on each receptacle between terminals and slots	OFF	D-2, D-5	J54-J62	Replace receptacle J58-J62 PN 358-092-00 or J54-J57 PN 351-240-01
	Failed EMI/ RFI filter	Compare voltage at input/ output of EMI/RFI filter	ON	D-3, D-5	Voltage at filter output should match voltage at filter input	Replace EMI/RFI filter P/N 521-353-00
No voltage present on Switched AC output	F1, F2, or F3 fuses are blown or bad connection to Phase Controller Assembly connector J4.	Check fuses and inspect for possible causes of blown fuses. Check power to J4 of Phase Controller Assembly.	OFF/ON	D-3, D-5	Perform continuity check on fuses. There should be 120VAC +10/-15% at J4, between pins 1-4, 2-4, 3-4.	Replace fuse(s) F1, F2, or F3 (any one or all) PN 471-596-01. Repair loose or broken connections to Phase Controller Assembly
	Branch breaker tripped or off	Visual inspection	ON	D-2, D-5	CB10-CB12	Check for overload problem, reset tripped branch breaker



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Externally supplied 15Khz signal not within specifications (J66)	Measure 15Khz control signal at J9, Pins 24-25 of Phase Controller Assembly.	ON	D-2, D-6	Must be 15Khz square wave +/- 2%, 50% duty cycle, +/-2%, TTL level	Repair signal source (External to PDU)
	Contactor coil defective	24VDC control voltage present at coil but contactor not pulled in	ON	D-3, D-5	Check for 24VDC at input to CON1 wire #'s 72 & 73	Replace contactor CON1 PN 361-076-00
	Control power not present due to tripped control circuit breakers	Visual Inspection of CB's	ON	D-2, D-5	CB2, CB3	Reset circuit breaker CB2, CB3
	Control Circuit breaker failure	Perform visual/operational inspection, and/or voltage check at input/output of control circuit breakers	ON	D-2, D-5	Check for normal operation of circuit breakers by measuring input and output from breaker CB2 and CB3	Reset or replace circuit breaker CB2 PN 522-995-02 or CB3 PN 523-354-04



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Loose or poor control circuit connection	Visual/continuity inspection:	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J3 to contactor, SMC connector to Phase Controller Assembly J9 (RC3), power source to Phase Controller Assembly J4	Repair loose connection in control path
	Loose or poor power circuit connection	Visual inspection and/or continuity check on effected circuit	OFF	D-3, D-5	T1 to CON1, CON1 CB10-CB12, CB10-CB12 to J50-J53 (see distribution schematic for wire #'s)	Tighten effected connections between transformer secondary and output receptacles
	24V power supply failure	Check power supply input/output voltage at test points	ON	D-2, D-3, D-5	Input voltage between test points "24VAC" and "N" should be 20-28 VAC, Output voltage between "24VDC" test point and "N" test point should be 22-28 VDC	Replace power supply REG1 PN 361-154-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Failed output circuit breaker	Perform visual/operational inspection, and/or voltage check at output circuit breakers.	ON	D-2, D-5	CB10-CB12 input voltage should be 120VAC from any terminal to case ground. Output voltage should match input when breaker is "on", should be zero when breaker is "tripped" or "off"	Replace circuit breaker CB10-CB11 PN 522-995-16 or CB12 PN 523-355-16
	Phase Controller Assembly defective	Check for proper output voltage to AC contactor coil.	ON	D-3, D-4, D-5, D-6	With a proper 15kHz signal applied, Phase Controller Assembly J3, pin 1-3 should be approximately 24V DC	Replace Phase Controller Assembly PN 361-157-00
	Failed output receptacle	Visually inspect receptacle and/or perform continuity check on each receptacle between terminals and slots	OFF	D-2, D-5	J50-J53	Replace receptacle J52-J53 PN 351-240-00 or J50 PN 351-358-00 or J51 PN 4990334
	Failed EMI/RFI filter	Compare voltage at input/output of EMI/RFI filter	ON	D-3, D-5	Voltage at filter output should match voltage at filter input	Replace EMI/RFI filter P/N 521-353-00

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Control transformer failure	Check voltages at input and output of control transformer	ON	D-3, D-5	T2 input voltage should be +10% to -15% of expected input voltage between wire #s 94 & 95. Output should be 20-28 VAC between wire #s 96 & 97	Replace control transformer T2 PN 541-242-00
DC output voltage too high or too low or erratic	AC Input voltage out of range	Measure AC input voltage	ON	D-2, V-1	Input voltage at test points should be +10% to -15% of expected voltage divided by 100	Correct source or select other PDU tap
	Feedback voltage connection problem between Phase Controller Assembly and DC output	Check continuity	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J1 wire #'s 177-178, 180-181 to DC output	Correct wire connection problem to J1 of Phase Controller Assembly.



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Poor connection from Gate Drive Assembly to SCR modules	Check continuity and visually inspect connector pins	OFF	D-4, D-5, D-6	Gate Drive Assembly J2, J11, J12 (see schematic for wire #'s)	Reseat or repair cables as necessary
	Poor connection from Phase Controller Assembly to Gate Drive Assembly	Check continuity and visually inspect connector pins	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J10 to Gate Drive Assembly J1, Phase Controller Assembly J31 to Gate Drive Assembly J5, Phase Controller Assembly J32 to Gate Drive Assembly J9,	Reseat or repair cables as necessary



Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	F1,F2, F3 or F6 fuses are blown or bad connection to Phase Controller Assembly connector J4 or Gate Drive Assembly J3	Check fuses and inspect for possible causes of blown fuses. Check power to J4 of Phase Controller Assembly and to Gate Drive Assembly J3	OFF	D-2, D-5	Perform continuity check on fuses. There should be 120VAC +10/-15% at Phase Controller Assembly J4, between pins 1-4, 2-4, 3-4, and at Gate Drive Assembly J3.	Replace fuse F1, F2, F3, or F6 (any one or all) PN 471-596-01. Repair loose or broken connections to Phase Controller Assembly or Gate Drive Assembly
	Failed power SCR	Measure input current to each SCR using current probe/oscilloscope. Access to wires can be had at glastic terminal board.	ON	D-4, D-5, D-6 Figure 1, Theory of operation.	Current wave shape should be similar to Figure 1. Amplitude will vary with applied load.	Replace Heat Sink Assembly PN 361-156-00
	Loose or poor connection from SCR to Inductor to Capacitor bank to output	Visually inspect connections	OFF	D-3, D-4, D-5, D-6	Check for tightness from Bar3 to L1 to Bar5 to F4-F5 to CONN3- CONN4 +, and Bar2 to Bar6 to CONN3 & CONN4 -	Tighten or repair connections as necessary

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad power connector	Visually inspect connectors	OFF	D-3, D-5	Check CONN3 & CONN4 for proper contact mating and/or cracked housings	Replace connector CONN3 and/or CONN4 PN 4990346

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Phase Controller Assembly malfunction	Check for proper gate control signals Using oscilloscope that has isolated inputs to channels: (Ensure Tester SMC connector is connected)	ON	D-3, D-4, D-5, D-6 See Theory of Operation, Figure 4 and 5	Sync channel 1 of scope to a power reference sine wave such as the output of the control transformer T2. Observe on channel 2: Phase Controller Assembly J31, pins 1,3,5,7,9,11 (for gates 1-6 respectively) & J32, pins 1,3,5,7,9,11 (for gates 7-12 respectively), pin 2 is common in any case, you should see a low level square wave (3-5Vpk) that is locked in phase to the power line reference. Gates 1-6- See Figure 4, Gates 7-12- See Figure 5.	Replace Phase Controller Assembly PN 361-157-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Gate Drive Assembly malfunction	Once Phase Controller Assembly has been eliminated as a problem source put a current probe onto each gate cathode wire and measure gate pulse current.	ON	D-3, D-4, D-5, D-6 See Theory of Operation, figure 2 and 3, for a depiction of a normal gate pulses.	Sync channel 1 of scope to a power reference sine wave such as the output of the control transformer T2. Check Gate Drive Assembly J2 wire #'s 298, 300, 302, 304, 306, 308, J11 wire #'s 310, 312, 314 & J12 wire #'s 316, 318, 320 for current pulses. Current pulses should be like those in Figure 2 and 3 and locked in phase to the power line reference.	Replace Gate Drive Assembly PN 361-155-00. It could also be a bad connection to a gate pin, or an open gate within the SCR
	Bad D7 diode	Continuity check	OFF	D-3, D-5	Disconnect one lead of D7 and check for open / short using an ohmmeter	Replace diode D7 PN 4990367
DC output ripple excessive	Failed ripple capacitor	Visual inspection for venting	OFF	D-3, D-5	Check C1-C6 for fluid leaking.	Replace capacitor C1-C6 (any or all) PN 131-428-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	F1,F2, F3 or F6 fuses are blown or bad connection to Phase Controller Assembly connector J4 or Gate Drive Assembly J3	Check fuses and inspect for possible causes of blown fuses. Check power to J4 of Phase Controller Assembly and to Gate Drive Assembly J3	OFF	D-3, D-5	Perform continuity check on fuses. There should be 120VAC +10/-15% at Phase Controller Assembly J4, between pins 1-4, 2-4, 3-4, and at Gate Drive Assembly J3.	Replace fuse F1, F2, F3 or F6 (any one or all) PN 471-596-01. Repair loose or broken connections to Phase Controller Assembly or Gate Drive Assembly
	Failed Power SCR	Measure input current to each SCR using current probe. Access to wires can be had at glastic terminal board.	ON	D-3, D-6	Current waveshape should be similar to Figure 1. Amplitude will vary with applied load.	Replace Heat Sink Assembly PN 361-156-00
	Poor connection from Gate Drive Assembly to SCR modules	Check continuity	OFF	D-3, D-4, D-6	Gate Drive Assembly J2, J11, J12 (see schematic for wire #'s)	Reseat or repair cables as necessary

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Poor connection from Phase Controller Assembly to Gate Drive Assembly	Check continuity	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J31 to Gate Drive Assembly J5 (RC5), Phase Controller Assembly J32 to Gate Drive Assembly J9 (RC7),	Reseat or repair cables as necessary

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Phase Controller Assembly malfunction	Check for proper gate control signals Using oscilloscope that has isolated inputs to channels: (Ensure Tester SMC connector is connected)	ON	D-3, D-4, D-5, D-6 See Theory of Operation, figure 4 and 5, for a depiction of a normal gate voltage square waves.	Sync channel 1 of scope to a power reference sine wave such as the output of the control transformer T2. Observe on channel 2: Phase Controller Assembly J31, pins 1,3,5,7,9,11 (for gates 1-6 respectively) & J32, pins 1,3,5,7,9,11 (for gates 7-12 respectively), pin 2 is common in any case, you should see a low level square wave (3-5Vpk) that is locked in phase to the power line. Gates 1-6- See Figure 4, Gates 7-12- See Figure 5.	Replace Phase Controller Assembly PN 361-157-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Gate Drive Assembly malfunction	Once Phase Controller Assembly has been eliminated as a problem source put a current probe onto each gate cathode wire and measure gate pulse current.	ON	D-3, D-4, D-5, D-6 4100019_020_060_SCB, See Theory of Operation, figure 2 and 3, for a depiction of a normal gate pulses.	Sync channel 1 of scope to a power reference sine wave such as the output of the control transformer T2. Check Gate Drive Assembly J2 wire #'s 298, 300, 302, 304, 306, 308, J11 wire #'s 310, 312, 314 & J12 wire #'s 316, 318, 320 for current pulses. Current pulses should be like those in Figure 2 and 3 and locked in phase to the power line reference.	Replace Gate Drive Assembly PN 361-155-00. It could also be a bad connection to a gate pin, or an open gate within the SCR
DC output voltage not present	Signal source not within specification or missing.	15Khz DC-ON signal not shown on controller LED.	ON	D-2, D-3, D-4, D-5, D-6	Check 15Khz source from SMC at 25 Pin D-sub connector J9 Must be 15Khz square wave +/- 2%, 50% duty cycle, +/-2%, TTL level	Repair source of signal (External to PDU)



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	F1, F2, F3 or F6 fuses are blown or bad connection to Phase Controller Assembly connector J4 or Gate Drive Assembly J3	Check fuses and inspect for possible causes of blown fuses. Check power to J4 of Phase Controller Assembly and to Gate Drive Assembly J3	OFF	D-3, D-5	Perform continuity check on fuses. There should be 120VAC +10/-15% at Phase Controller Assembly J4, between pins 1-4, 2-4, 3-4, and at Gate Drive Assembly J3.	Replace fuse F1, F2, F3, or F6 (any one or all) PN 471-596-01. Repair loose or broken connections to Phase Controller Assembly or Gate Drive Assembly
	Bad connection from Phase Controller Assembly J9 to SMC connector J66	Check cable connection from SMC PDU connector to Phase Controller Assembly	OFF	D-2, D-3, D-4, D-5, D-6	Check Phase Controller Assembly J9 ribbon cable for proper connection (RC3)	Repair or replace RC3 PN 4990372
	DC Fuse(s) blown	Continuity check. Voltages V0, V1 and V2 to SMC will not be equal. V0 is main DC bus and V1 and V2 are protected by branch fuses within PDU	OFF	D-3, D-5	Perform continuity check on fuses F4 and/or F5.	Check load for possible cause of overload and replace fuse F4 and/or F5 PN 471-688-00
	Poor connection from Gate Drive Assembly to SCR modules	Check continuity	OFF	D-3, D-4, D-5, D-6	Gate Drive Assembly J2, J11, J12 (see schematic for wire #'s)	Reseat or repair cables as necessary



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Poor connection from Phase Controller Assembly to Gate Drive Assembly	Check continuity	OFF	D-2, D-3, D-4, D-5, D-6	Phase Controller Assembly J31 to Gate Drive Assembly J5 (RC5), Phase Controller Assembly J32 to Gate Drive Assembly J9 (RC7),	Reseat or repair cables as necessary
	Loose or poor connection to AC input for Phase Controller Assembly	Visually inspect connector	ON	D-3, D-4, D-5, D-6	Check J4 on Phase Controller Assembly for solid connections.	Repair connection.



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Phase Controller Assembly malfunction	Check for proper gate control signals Using oscilloscope that has isolated inputs to channels: (Ensure Tester SMC connector is connected)	ON	D-3, D-4, D-5, D-6 See Theory of Operation, figure 4 and 5, for a depiction of a normal gate voltage square waves.	Sync channel 1 of scope to a power reference sine wave such as the output of the control transformer T2. Observe on channel 2: Phase Controller Assembly J31, pins 1,3,5,7,9,11 (for gates 1-6 respectively) & J32, pins 1,3,5,7,9,11 (for gates 7-12 respectively), pin 2 is common in any case, you should see a low level square wave (3-5Vpk) that is locked in phase to the power line. Gates 1-6- See Figure 4, Gates 7-12- See Figure 5.	Replace Phase Controller Assembly PN 361-157-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Gate Drive Assembly malfunction	Once Phase Controller Assembly has been eliminated as a problem source put a current probe onto each gate cathode wire and measure gate pulse current.	ON	D-3, D-4, D-5, D-6 See Theory of Operation, figure 2 and 3, for a depiction of a normal gate pulses.	Sync channel 1 of scope to a power reference sine wave such as the output of the control transformer T2. Check Gate Drive Assembly J2 wire #'s 298, 300, 302, 304, 306, 308, J11 wire #'s 310, 312, 314 & J12 wire #'s 316, 318, 320 for current pulses. Current pulses should be like those in Figure 2 and 3 and locked in phase to the power line reference.	Replace Gate Drive Assembly PN 361-155-00. It could also be a bad connection to a gate pin, or an open gate within the SCR
	Loose or poor connection from SCR to Inductor to Capacitor bank to output	Visually inspect connections	OFF	D-3, D-4, D-5, D-6	Check for tightness from Bar3 to L1 to Bar5 to F4-F5 to CONN3- CONN4 +, and Bar2 to Bar6 to CONN3 & CONN4 -	Tighten or repair connections as necessary



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad CONN3-CONN4 power connector	Visually inspect connectors	OFF	D-3, D-5	Check CONN3 & CONN4 for proper contact mating and/or cracked housings	Replace connector CONN3-CONN4 PN 4990346
When turned off, DC output does not reach 2V in less than 10 Seconds	Bad connection from Phase Controller Assembly to Gate Drive Assembly	Check continuity	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J10 to Gate Drive Assembly J1	Repair or replace cable
	F1,F2, F3 fuses are blown or bad connection to Phase Controller Assembly connector J4	Check fuses and inspect for possible causes of blown fuses. Check power to J4 of Phase Controller Assembly	OFF	D-3, D-5	Perform continuity check on fuses. There should be 120VAC +10/-15% at Phase Controller Assembly J4, between pins 1-4, 2-4, 3-4	Replace fuse F1, F2, or F3 (any one or all) PN 471-596-01. Repair loose or broken connections to Phase Controller Assembly



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Fast bleeder resistor(s) open circuited on Gate Drive Assembly	Resistance measurement	OFF	D-3, D-4, D-5, D-6	Disconnect Gate Drive Assembly connector J1. Resistance of Gate Drive Assembly resistors R19-R20, R62-64 should read less than 4.5 ohms in parallel	Replace Gate Drive Assembly PN 361-155-00
	Failed Power SCR	Measure input current to each SCR using current probe. Access to wires can be had at glastic terminal board.	ON	D-3, D-4, D-5, D-6	Current waveshape should be similar to Figure 1. Amplitude will vary with applied load.	Replace Heat Sink Assembly PN 361-156-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Phase Controller Assembly malfunction	Check for proper bleeder power switching signal with oscilloscope. (Ensure Tester SMC connector is connected)	ON	D-3, D-4, D-5, D-6	Attach scope common to pin 12 or J10 and scope tip to pin 5 of J10. Expect approximately 48V when DC output is on. Test 1: Starting with DC power on and no load, trip input CB: pin 5 should go low (~2V or less) for 10 seconds. Test 2: Starting with DC power on and no load, turn off 15Khz DC control signal: pin 5 should go low (~2V or less) for 10 seconds.	Replace Phase Controller Assembly PN 361-157-00
Magnetic indicators do not reset upon power-up	Connection between Phase Controller Assembly and Test Point PC Board Assembly bad	Check continuity	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J11 to Test Point PC Board Assembly J11 (RC4)	Replace RC4 PN 4990373



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Failed magnetic indicator	Reset signals measured at Test Point PC Board Assembly but magnetic indicator does not reset.	ON	D-2, D-3, D-4, D-5	Use oscilloscope to check reset signal at Test Point PC Board Assembly J11 pins 5 to pin 12, should be 24VDC pulse of at least 100ms	Replace indicator IND1, IND2, or, IND3 (any or all) magnetic PN 501-325-02
	F1,F2, F3 fuses are blown or bad connection to Phase Controller Assembly connector J4	Check fuses and inspect for possible causes of blown fuses. Check power to J4 of Phase Controller Assembly	OFF	D-3, D-5	Perform continuity check on fuses. There should be 120VAC +10/-15% at Phase Controller Assembly J4	Replace blown fuse F1, F2, or F3 (any one or all) PN 471-596-01. Repair loose or broken connections Phase Controller Assembly
	Loose or poor connection between Test Point PC Board Assembly and magnetic indicator	Visual / continuity check	OFF	D-2, D-3, D-5	J104 - J106 on Test Point PC Board Assembly	Repair or reseal in connection



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Phase Controller Assembly malfunction	Check for proper signal with Oscilloscope.	ON	D-3, D-4, D-5, D-6	Connect scope common to J11, Pin 6 (24Vdc common). Connect scope tip to J11, Pin 12. Apply power to PDU and turn on input breaker. Pin 12 should transition low for at least 100mS. Toggle reset switch for Phase Controller Assembly. Pin 12 should transition low for at least 100mS.	Replace Phase Controller Assembly PN 361-157-00
Can't turn on input circuit breaker	No input power	Measure AC input voltage. Input breaker will not turn on without a source of input power.	ON	D-2, D-3, D-5, V-1	Check input voltage at test points, should be +10% to -15% of expected voltage divided by 100	Provide correct 3 phase power to PDU



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Control transformer improperly tapped resulting in a low control circuit voltage	Check control voltages at test points. Check that control transformer tap selected matches input voltage.	ON	D-3, D-5	Check voltage at 24VAC test points, should be 20-28 VAC.	Re-tap control transformer T2 to match input voltage
	Internal interlock open / bad interlock switch	Check that all covers are in place and that all interlock switches are closed.	OFF	D-3, D-5	LS1 - LS3, normally closed switches	Tighten down loose cover. Or replace interlock switch LS1, LS2, or LS3 (any or all) PN 801-646-01
	External interlock open	Check continuity of external EMO loops.	OFF	N/A	N/A	Correct external EMO loop problem.
	Thermal cutout switch failure	Check continuity across thermal switch. This switch is normally closed	OFF	D-5	Check TH1 for normal operation at wire #'s 80 & 81. Should be closed below 160°C	Replace thermal cutout TH1 PN 4990378



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	24V power supply failure	Check power supply input/output voltage at test points	ON	D-2, D-3, D-5	Input voltage between test points "24VAC" and "N" should be 20-28 VAC, Output voltage between "24VDC" test point and "N" test point should be 22-28 VDC	Replace power supply REG1 PN 361-154-00
Voltages at control voltage test points too low or not present	No input power	Measure AC input voltage. Input breaker will not turn on without a source of input power.	ON	D-2, D-3, D-5, V-1	Check input voltage at test points, should be +10% to -15% of expected voltage divided by 100	Provide correct 3 phase power to PDU
	Control transformer improperly tapped resulting in a low control circuit voltage	Check control voltages at test points. Check that control transformer tap selected matches input voltage.	ON	D-3, D-5	Check voltage at 24VAC test points, should be 20-28 VAC.	Re-tap control transformer T2 to match input voltage
	Internal interlock open / bad interlock switch	Check that all covers are in place and that all interlock switches are closed.	OFF	D-3, D-5	LS1 - LS3, normally closed switches	Tighten down loose cover. Or replace interlock switch LS1, LS2, or LS3 (any or all) PN 801-646-01



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	External interlock open	Check continuity of external EMO loops.	OFF	N/A	N/A	Correct external EMO loop problem.
	Thermal cutout switch failure	Check continuity across thermal switch. This switch is normally closed	OFF	D-5	Check TH1 for normal operation at wire #'s 80 & 81. Should be closed below 160°C	Replace thermal cutout TH1 PN 4990378
	24V power supply failure	Check power supply input/output voltage at test points	ON	D-3, D-5	Input voltage between test points "24VAC" and "N" should be 20-28 VAC, Output voltage between "24VDC" test point and "N" test point should be 22-28 VDC	Replace power supply REG1 PN 361-154-00
Input CB does not trip on EMO or interlock operation	Short in control loop	Locate short by checking various points for continuity	OFF	D-3, D-5	See schematic for potential wire #'s and switches	Repair control loop short.



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	External EMO button or PDU interlock switch stuck in the closed position	Locate faulty switch or push button	OFF	D-3, D-5	Use ohmmeter to check LS1 - LS3 for proper operation. Should be closed when depressed or defeated, open when released	Replace external push button or replace interlock switch LS1, LS2, or LS3 (any or all) PN 801-646-01
	Faulty U/V Coil on input breaker CB1	Voltage at U/V input coil properly goes to 0V but breaker does not trip.	ON	D-2, D-3, D-5	Measure voltage at TB4, position 3 & 4. Should be 0VDC to trip breaker	Replace circuit breaker CB1 PN 523-353-00
	Failed EMO connector	Visually inspect connector	OFF	D-2, D-5	Check J63 - J64 for proper connection	Repair or replace connector J63 and/ or J64 PN 4990377
Feedback signal frequency does not correspond to measured DC current	Current transducer wiring problem	Visual inspection or continuity check	OFF	D-3, D-5, D-6	Check I1 - I2 current transducers for proper connection to Phase Controller Assembly JA2, JB2 (pin1 on Phase Controller Assembly J2 corresponds to pin 1 on transducer connector)	Repair or replace connections as necessary



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad connection from Phase Controller Assembly J9 to SMC connector J66	Check cable connection from SMC PDU connector to Phase Controller Assembly	OFF	D-2, D-3, D-4, D-5, D-6	Check Phase Controller Assembly J9 ribbon cable for proper connection (RC3)	Repair or replace RC3 PN 4990372
	Current transducer malfunction	DC voltage from current transducer does not correspond with measured DC current.	ON	D-3, D-4, D-5, D-6	Measure DC voltage at current transducer, should be 0.05 volts/amp	Replace current transducer I1 and/or I2 PN 541-243-00
	Phase Controller Assembly malfunction	Check for proper signal with Oscilloscope. (Ensure Tester SMC connector is connected. Tester provides 5V power for open collector outputs.)	ON	D-3, D-4, D-5, D-6	Feedback signals are 50% duty cycle square wave proportional to DC current. Frequency corresponds to 15mA per Hz with 100 Hz. equal to 0 Amps, 10100 Hz equal to 150 Amps. (100-10100 Hz range)	Replace Phase Controller Assembly PN 361-157-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	DC output current too low	Check actual load current	OFF	N/A		Low currents can not be accurately detected with the hall effect based transducer. This is normal operation
	F1,F2, or F3 fuses are blown	Check fuses and inspect for possible causes	OFF	D-3, D-5	Perform continuity check on fuses	Replace fuse F1, F2, or F3 (any one or all) PN 471-596-01.
Feedback signal frequency does not correspond to measured AC phase rms voltage.	Loose or poor connection to AC input for Phase Controller Assembly	Visually inspect connector	ON	D-3, D-4, D-5, D-6	Check J4 on Phase Controller Assembly for solid connections.	Repair connection.
	F1,F2, or F3 fuses are blown	Check fuses and inspect for possible causes	OFF	D-3, D-5	Perform continuity check on fuses	Replace fuse F1, F2, or F3 (any one or all) PN 471-596-01.



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Phase Controller Assembly malfunction	Check for proper signal with Oscilloscope. (Ensure Tester SMC connector is connected. Tester provides 5V power for open collector outputs.)	ON	D-3, D-4, D-5, D-6	Feedback signals are 50% duty cycle square wave proportional to AC RMS voltage. Frequency corresponds to 25mV per Hz with 100 Hz. equal to 0 Volts, 10100 Hz equal to 250 Volts (100-10100 Hz range)	Replace Phase Controller Assembly PN 361-157-00
	Bad connection from Phase Controller Assembly J9 to SMC connector J66	Check cable connection from SMC PDU connector to Phase Controller Assembly	OFF	D-3, D-4, D-5, D-6	Check Phase Controller Assembly J9 ribbon cable for proper connection (RC3)	Repair or replace RC3 PN 4990372
Feedback signal frequency does not correspond to measured DC output voltage.	Loose or poor connection to AC input for Phase Controller Assembly	Visually inspect connector	ON	D-3, D-4, D-5, D-6	Check J4 on Phase Controller Assembly for solid connections.	Repair connection.



Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad connection from Phase Controller Assembly J9 to SMC connector J66	Check cable connection from SMC PDU connector to Phase Controller Assembly	OFF	D-2, D-3, D-4, D-5, D-6	Check Phase Controller Assembly J9 ribbon cable for proper connection (RC3)	Repair or replace RC3 PN 4990372
	Phase Controller Assembly malfunction	Check for proper signal with Oscilloscope. (Ensure Tester SMC connector is connected. Tester provides 5V power for open collector outputs.)	ON	D-2, D-3, D-4, D-5, D-6	Feedback signals are 50% duty cycle square wave proportional to DC voltage. Frequency corresponds to 10mV per Hz with 100 Hz. equal to 0 Volts, 10100 Hz equal to 100 Volts. (100-10100 Hz range)	Replace Phase Controller Assembly PN 361-157-00
"Maintenance: LED & signal present - Fan fail"	Fan failure or bad connection	Check fan and connection corresponding to maintenance signal code.	OFF/ ON	D-2, D-3, D-4, D-5, D-6	Check connection on J1-J10 on Fan PCB. Check for rotation of FAN1-FAN10	Repair any connections. If any fan is not rotating, replace fan FAN1-FAN8 PN 361-175-00 FAN9-FAN10 PN 361-176-00

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
"Maintenance" LED & signal present - Overtemperature	DC current overload	Check load currents and determine if load currents are below 260A DC total	N/A	N/A	N/A	Repair problem with load equipment
	Ambient temperature too high	Check that vents are not blocked, that fans are working and that external ambient is less than 30°C.	ON	D-2, D-3, D-6	Check for rotation of FAN1-FAN10	Repair problem. If any fan is not rotating, replace fan FAN1-FAN8 PN 361-175-00 FAN9-FAN10 PN 361-176-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Failed Temperature Sensor	Check for proper output voltage of sensors.	ON	D-2, D-3, D-4, D-5, D-6	At room temperature measure output voltage of each sensor. Output should be 500mV + 10mV per °C ± 5% Temperature signals for three sensors are pins 2, 6, 10 of Phase Controller Assembly J5, with respect to pin 4 of J5. Sensors derive power from Phase Controller Assembly and must be plugged in during the measurement.	Replace Temperature Sensor Assembly PN 4990370

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
"Maintenance" & LED signal present - Watch Dog Timer	Phase Controller Assembly malfunction	Check maintenance signal after controller reset.	ON	D-2, D-3, D-4, D-5, D-6	Apply power to the PDU. Observe maintenance indicator. If maintenance indicator transitions from off to on after 1-3 seconds of power application or controller reset, this indicates a watchdog timer time-out condition.	Replace Phase Controller Assembly PN 361-157-00
"Power Available" LED not properly illuminated	Bad indicator light	Replace light, recheck	OFF	D-2, D-5	LED1	Replace light LED1 PN 702-393-00
	Bad connection from Test Point PC Board Assembly to light	Check continuity; check that light is plugged in.	OFF	D-2, D-3, D-5	Test Point PC Board Assembly J102 to LED1	Repair connection.



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad connection from Test Point PC Board Assembly to Phase Controller Assembly	Check continuity	OFF	D-2, D-3, D-5	Phase Controller Assembly J11 to Test Point PC Board Assembly J11 (RC4)	Repair or replace RC4 PN 4990373
	Test Point PC Board Assembly malfunction	No signal at output to light	ON	D-2, D-3, D-5	Test Point PC Board Assembly J102 output to LED should measure at least 17VDC	Replace Test Point PC Board Assembly PN 361-158-00
	F1,F2, F3 fuses are blown or bad connection to Phase Controller Assembly connector J4	Check fuses and inspect for possible causes of blown fuses. Check power to J4 of Phase Controller Assembly	OFF/ON	D-3, D-4, D-5, D-6	Perform continuity check on fuses. There should be 120VAC +10/-15% at Phase Controller Assembly J4, between pins 1-4, 2-4, 3-4	Replace fuse F1, F2, or F3 (any one or all) PN 471-596-01. Repair loose or broken connections to Phase Controller Assembly
"48 VDC Present" LED not properly illuminated	Bad indicator light	Replace light, recheck	OFF	D-2, D-5	LED4	Replace light LED4 PN 702-393-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad connection from Test Point PC Board Assembly to light	Check continuity; check that light is plugged in.	OFF	D-2, D-3, D-5	Test Point PC Board Assembly J102 to LED4	Repair connection.
	Bad connection from Test Point PC Board Assembly to Phase Controller Assembly	Check continuity	OFF	D-2, D-3, D-5	Phase Controller Assembly J11 to Test Point PC Board Assembly J11 (RC4)	Repair or replace RC4 PN 4990373
	Test Point PC Board Assembly malfunction	No signal at output to light	ON	D-2, D-3, D-5	Test Point PC Board Assembly J102 output to LED should measure at least 17VDC	Replace Test Point PC Board Assembly PN 361-158-00
	Feedback voltage connection problem between Phase Controller Assembly and DC output	Check continuity	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J1 wire #'s 177-178, 180-181 to DC output	Correct wire connection problem to J1 of Phase Controller Assembly.



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
"Main Power On" LED not properly illuminated	Bad indicator light	Replace light, recheck	OFF	D-2, D-5	LED2	Replace light LED2 PN 702-393-00
	Bad connection from Test Point PC Board Assembly to light	Check continuity; check that light is plugged in.	OFF	D-2, D-3, D-5	Test Point PC Board Assembly J102 to LED2	Repair connection.
	Bad connection from Test Point PC Board Assembly to Phase Controller Assembly	Check continuity	OFF	D-2, D-3, D-5	Phase Controller Assembly J11 to Test Point PC Board Assembly J11 (RC4)	Repair or replace RC4 PN 4990373
	Test Point PC Board Assembly malfunction	No signal at output to light	ON	D-2, D-3, D-5	Test Point PC Board Assembly J102 output to LED should measure at least 17VDC	Replace Test Point PC Board Assembly PN 361-158-00
	Bad CB1 AUX1 contact	Check continuity of CB1 AUX1 contacts	OFF	D-2, D-3, D-5	AUX1 contacts should be closed with CB1 on and open with CB1 off	Replace input circuit breaker CB1 PN 523-353-00

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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad connection from Phase Controller Assembly to CB1 AUX1	Visually inspect connections	OFF	D-2, D-3, D-5	Phase Controller Assembly J3 pin 5	Repair connection as necessary
"Test Power On" LED not properly illuminated	Bad indicator light	Replace light, recheck	OFF	D-2, D-5	LED3	Replace light LED3 PN 702-393-00
	Bad connection from Test Point PC Board Assembly to light	Check continuity; check that light is plugged in.	OFF	D-2, D-3, D-5	Test Point PC Board Assembly J102 to LED3	Repair connection.
	Bad connection from Test Point PC Board Assembly to Phase Controller Assembly	Check continuity	OFF	D-2, D-3, D-5	Phase Controller Assembly J11 to Test Point PC Board Assembly J11 (RC4)	Repair or replace RC4 PN 4990373
	Test Point PC Board Assembly malfunction	No signal at output to light	ON	D-2, D-3, D-5	Test Point PC Board Assembly J102 output to LED should measure at least 17VDC	Replace Test Point PC Board Assembly PN 361-158-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad AUX2 switch on CON1	Check continuity of AUX switch on CON1 (actuate CON1 by hand)	OFF	D-3, D-5	AUX2 contacts switch should be closed with CON1 actuated and open with CON1 released	Replace contactor PN 361-076-00
	Bad connection from Phase Controller Assembly to contactor	Visually inspect connections	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J3 pin 6	Repair connection.
Test points not functioning	Bad connection from Test Point PC Board Assembly to Phase Controller Assembly	Check continuity	OFF	D-3, D-4, D-5, D-6	Phase Controller Assembly J11 to Test Point PC Board Assembly J11 (RC4)	Repair or replace RC4 PN 4990373
	Test Point PC Board Assembly malfunction	Check continuity	OFF	D-3, D-5,	Using ohmmeter, check continuity between Test Point PC Board Assembly J100 - output/N/G, J101 - input, J103 - 24VAC, J107 - 24VDC, J200/201 - 48VDC	Replace Test Point PC Board Assembly PN 361-158-00



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Symptom	Possible Cause	Determination	Input Power During Check	Reference Schematic/ Drawing	Reference Designator/ Value	Solution
	Bad connection from Test Point PC Board Assembly to CB1	Check continuity and visually inspect connections	OFF	D-2, D-3, D-5	Test Point PC Board Assembly J101, wire #'s 17-19	Repair connection.
	Bad connection from Test Point PC Board Assembly to 24V power supply	Check continuity and visually inspect connections	OFF	D-2, D-3, D-5	Test Point PC Board Assembly J103, wire #'s 1167-168 & J107, wire #'s 77, 333	Repair connection.
	Bad connection from Test Point PC Board Assembly to F1-F3	Check continuity and visually inspect connections	OFF	D-3, D-5	Test Point PC Board Assembly J100, wire #'s 164-166	Repair connection.
	Phase Controller Assembly malfunction	Phase Controller Assembly provides pass-through connection of 24V DC and current limiting resistors for TP_V0-V2. (Possible but unlikely cause).	ON	D-3, D-4, D-5, D-6	Check signals from J11, Pins 2,3,4 with respect to J11, Pin 1. Voltage should be close to the voltages present at 48V DC power output.	Replace Phase Controller Assembly PN 361-157-00



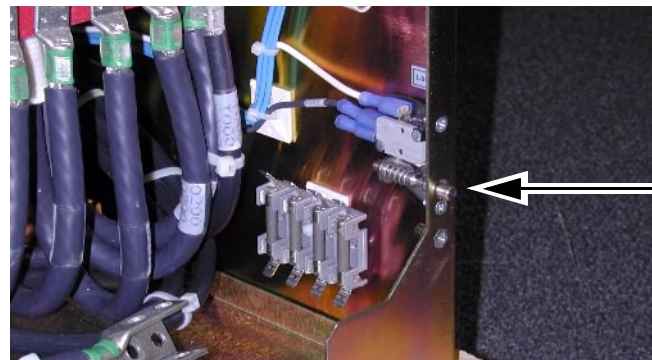
PDU Interlock Switch Troubleshooting

The PDU interlock system consists of three interlock switches wired in series between the negative terminal of the 24 Volt PDU low voltage power supply and the PDU transformer thermal cutout TH1. To troubleshoot the PDU interlock system, first remove, lock out, and tag out all AC power to the system.

⚡
W A R N I N G !
⚡

Disabling CB1 is not sufficient, all AC power must be disabled.

Remove the service access panels from the PDU and measure the resistance value across the terminals of each switch. Each switch should have infinite resistance with the panel removed. Manually depress each switch and the resistance across it should drop to near zero. Replace any switch that fails this test. Refer to the [PDU Electrical Schematic](#) for wiring information. The switch designators are LS1, LS2, and LS3.



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PDU Interlock Switch (1 of 3)

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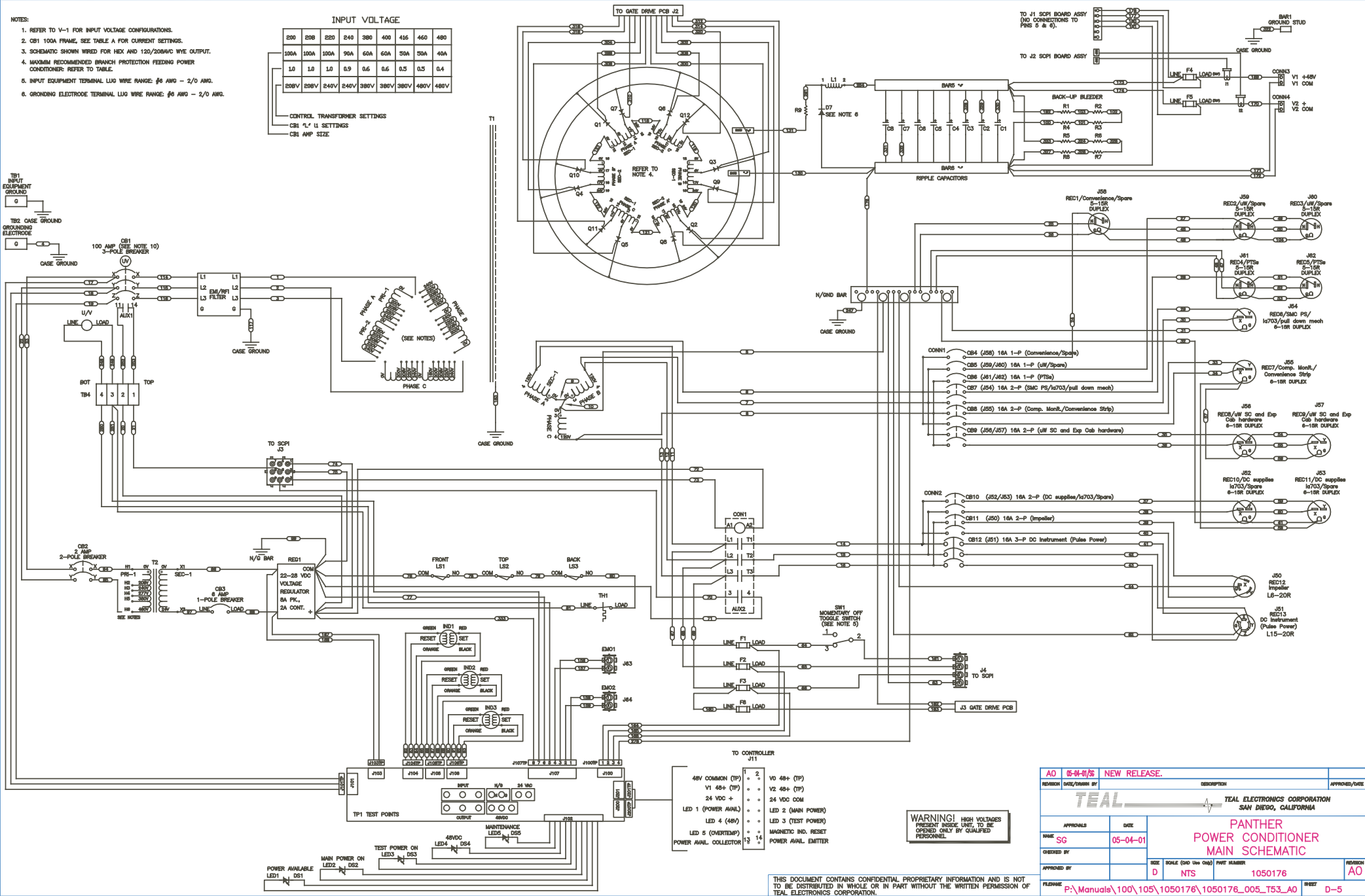


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PDU Electrical Schematic



AD 05-04-01	NEW RELEASE.		
REVISION	DATE/OWNER BY	DESCRIPTION	APPROVED/DATE
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APPROVALS	DATE	PANTHER POWER CONDITIONER MAIN SCHEMATIC	
NAME SG	05-04-01	SIZE D	SCALE (IND Use Only) PWT NUMBER 1050176
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